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TEXTURE EDGE DETECTION BY PROPAGATION AND SHRINKING

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The problem of detecting edges between differently textured regions is important in the process of segmentation of remotely sensed images. However, the concept of texture is difficult to be precisely defined and there seems to be no unique way to characterize texture. One possible approach is through the use of edge detection algorithms and in these terms texture is conceived as edgeness per unit area. Regions that possess a wide variation in tone will be characterized by a high concentration of local edges and the opposite is true for smooth regions.

The algorithm for texture edge detection that is proposed in this paper is based on the detection of local edges followed by the processes of propagation and shrinking of regions and the determination of the periphery of the resulting sets. The local edge detection method is formulated in statistical terms and it leads to the solution of a hypothesis testing problem. Similar results could be obtained by using differentiation techniques like the gradient, for example. After the local edges are detected, a propagation process, followed by a shrinking process, will tend to eliminate the holes and the isolated points in the binary image defined by the local edges. The border of the textured regions is obtained by determining the periphery of the resulting connected components sets S's through the computation of the set of points with unitary distance to $\overline{S}$ (the complement of S). This set can be obtained through a shrinking process.

Variations of the methods of propagation and shrinking were also attempted. These variations are based on thresholds on the number of neighbors (on a 8-neighborhood) of a point, that determine whether the point remain in S, move from S to $\overline{S}$ or vice-versa.

The methods were tested on Landsat images of the State of Mato Grosso, Brasil. Preliminary results seem to indicate that the variations of the propagation and shrinking methods based on the use of thresholds tend to give edges that are more continuous.

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